

Willard Bay Project Proposal Form

Applicant name: Ben Watkins

Project Title: **Bank Erosion Prevention along Channel Segments and Resulting Water Quality**

Agency Name: Box Elder High School

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NOTE: This is an **academic** institution and project.

Estimated Project Costs	
Labor	\$0
Materials	\$1192.35
Equipment	\$1101.14
Administration	\$1120
Miscellaneous	\$2624
TOTAL	\$6037.49

Other sources of project funding

- Utah State University Extension will provide materials to sample water quality.
- Box Elder High School student lab fees will provide for limited equipment and supplies.

Purpose and need of project

As we understand it, following the pipeline leak, beaver ponds and other areas along the Channel Segments were altered by heavy machinery in an effort to clean up the spill. These areas will need significant restoration.

Next year, Box Elder High will offer an Ecology course. Up to this point at Box Elder High (and at the high school level in general) there have existed few opportunities for students to do actual science research (including statistical analysis) and service learning. This project would provide students an opportunity for long-term research (four years or longer). This project will also

allow students to gain an appreciation for ecosystems and feel that they are making a true contribution toward ecosystem improvement.

Students will sample water quality along the Channel Segments over a four-year period. They will simultaneously plant live stakes and jute mesh in disturbed areas of the Channel Segments. Students will conduct long-term research to see how bank stabilization and revegetation will affect water quality. Measurements will include pH, dissolved oxygen, turbidity, and temperature. Water quality studies will also include aquatic invertebrates.

The hope is that, by getting students into the science beyond the textbooks and lectures, they will actually gain an excitement for what the creative, energizing process of science actually is. Too often science courses are designed to tell students what other people using the process of science have already discovered. The first goal is that the students themselves will be the researchers and add to the ever-growing body of science knowledge. And our second goal is that students will understand the meaning of conservation and stewardship.

Estimated time frame

- September 2014 – water quality sampling on Channel Segments
- October 2014 – collect willow and other riparian cuttings
- October 2014 – lay 4 rolls of jute mesh along with live stakes
- September 2015 – water quality sampling on Channel Segments
- October 2015 – collect willow and other riparian cuttings
- October 2015 – lay 4 rolls of jute mesh along with live stakes
- September 2016 – water quality sampling on Channel Segments
- October 2016 – collect willow and other riparian cuttings
- October 2016 – lay 4 rolls of jute mesh along with live stakes
- September 2017 – water quality sampling on Channel Segments
- October 2017 – collect willow and other riparian cuttings
- October 2017 – lay 4 rolls of jute mesh along with live stakes
- December 2017 – Final report showing improvements and water quality trends, including statistical correlation, if any

Location and area

We expect to lay jute mesh and live stakes along 4500 square feet of stream bank in the spill area. Specific project areas would be determined based on consultation with park managers.



How project will specifically enhance and protect waterways

Dosskeyⁱ et al conducted a literature review and identified several ways in which riparian vegetation influences stream water chemistry. Vegetation uptakes chemicals directly, supplies organic matter to soils and channels, modifies water movement, and stabilizes soil. We expect that by stabilizing banks and adding native vegetation, we will see reduced DROs (diesel range organics) and other pollutants related or unrelated to the spill.

Increased vegetation will provide critical habitat for various invertebrate and vertebrate species, including the beavers displaced by the spill.

Project connectivity to other natural areas or projects

The Great Salt Lake ecosystem is home to many species of birds. By increasing vegetation, we expect to see an improvement in the quality of water flowing through the Channel Segments. Sensitive species such as aquatic invertebrates will increase in richness and diversity, thereby increasing food availability for birds. Fish in Willard Bay will benefit from more diverse insect and plant communities.

Social benefits

Approximately 240 students over a four-year period will give something back to the ecosystem that sustains them. They will have a greater sense of place. Students will understand the

research process from beginning to end. They will see connections between habitat improvement and environmental health.

Boaters, anglers, birders and other recreationists in the Willard Bay area will see an increase in fish and bird health and species richness, together with improved water quality and a more aesthetic State Park environment.

Project plans and details

In September each year, students will use materials provided by Utah State University Extension to measure pH, dissolved oxygen, turbidity, and temperature at randomly selected points along the Channel Segments. Students will also conduct an aquatic invertebrate assessment as another measure of water quality. They will then spend several days in the lab writing up findings and creating charts and graphs.

The following October, students will take one full day to make cut “live stakes.” Live stakesⁱⁱ are living, woody plant cuttings that can root easily. Willow works best for this system, but other species can be substituted, based on consultation with park personnel. The cuttings will be large enough and long enough to be hammered into the ground as stakes. The intent is that over time they will root and grow into shrubs which will then stabilize soils and restore riparian zone habitats.

Cuttings must be freshly cut and alive, with bark in place. The basal ends are to be cut cleanly at an angle so they can be easily inserted in the soil. A few days after gathering the cuttings, students will lay out erosion control fabric (jute mesh) and stakes will be used to secure down the fabric.

The following September, water quality will again be assessed, and students will take that data back to the lab and conduct analysis using R statistical software.

My experience

- Three summers as ecology/conservation director at Boy Scouts of America youth camps
 - Worked with NRCS to complete camp conservation plan
 - Created maps outlining camp conservation goals
 - Recruited volunteers to plant willow and other riparian cuttings along stream banks
 - Recruited volunteers to plant conifers
 - Recruited and supervised volunteers in revegetation, brushing, and other habitat improvements
- Four summers as a conservation and ecology instructor, Boy Scouts of America youth camps
- Six years as a biology, chemistry, and environmental science educator

Ongoing maintenance

Nucor Steel, Walmart, and ATK are strong supporters of education in Box Elder County. The first two companies solicit proposals yearly for school projects. ATK is eager to support science efforts in the school district. I will continue to solicit funding from these organizations to continue conservation work and research at the Willard Bay site. Obviously four years is not sufficient time to see true trends.

Students will continue to be eager to lend a hand in conservation and research efforts. I foresee this Ecology course continuing many years into the future.

Consultants

Nancy Mesner and Brian Greene from USU Water Quality Extension have been most supportive and helpful in providing assistance with water quality research plans. They will provide materials and expertise for students to conduct that research.

Brian Greene / Nancy Mesner
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ⁱ <http://nac.unl.edu/documents/research/publications/2010dosskeyriparianveg.pdf>

ⁱⁱ http://www.gaepd.org/Files_PDF/techguide/wpb/Guidelines_Streambank_Restoration_GSWCC_Revised_2000.pdf